2005 Base Year Aircraft Pb Emissions Inventory by Airport

SOURCE CLASSIFICATION CODE

22-75-000-000: Mobile Sources Aircraft All Aircraft Type & Operations Composite

DESCRIPTION OF SOURCE CATEGORY

The inventory covered 98 airports: sixteen airports that have FAA operated control towers, and 82 smaller public airports.   This inventory is an update from the version of the inventory presented in the 2002 and 2005 National Emissions Inventory (NEI). This document describes the revised method being used by the Environmental Protection Agency (EPA) to calculate the national inventory for lead emissions from leaded avgas. This method makes the estimation of lead emissions similar to the methods used by the Federal Aviation Administration (FAA) to estimate inventories of other criteria pollutants emitted by aircraft in its Emissions and Dispersion Modeling System (EDMS). Most piston-engine aircraft fall into the categories of either general aviation (GA) or air taxi (AT). Lead is not added to jet fuel that is used in commercial aircraft, military aircraft, or other turbine-engine powered aircraft.

GENERAL DESCRIPTION OF EMISSION ESTIMATE METHODOLOGY

The method used to estimate lead emissions at airports uses the following equation :

$$\text{Equation (1)} \qquad Pb(kg) = \frac{(\text{Piston-engine LTO}^{\,a,b})(7.34 \text{ g Pb / LTO}^{c})(0.95^{d})}{1,000 \text{ (g/kg)}}$$

This equation simplifies to the following:

$$Pb(kg) = (\text{Piston-engine LTO}) (7.0 \times 10^{-3})$$

$$\text{Where piston-engine} \quad LTO = (\text{GA LTO} + \text{AT LTO}) (0.72)$$

a) Piston-engine LTO: Most piston-engine aircraft fall into the categories of either general aviation (GA) or air taxi (AT). Some GA and AT activity is conducted by turboprop and turbojet aircraft which do not used leaded avgas. There are no national databases that provide airport-specific LTO activity data for piston-engine aircraft separately from turbojet and turboprop aircraft. The fraction of GA and AT aircraft that use piston engines will vary by airport. However, in the absence of airport-specific data, a national default estimate was derived using FAA's GA and AT Activity (GAATA) Survey.[10]   The 2005 GAATA Survey reports that approximately seventy-two percent (72%) of all GA and AT LTOs are from piston-engine aircraft which use avgas, and about twenty-eight percent (28%) are turboprop and turbojet powered which use jet fuel, such as Jet A.[11]   Lead is not added to jet fuel. Therefore, to calculate piston-engine aircraft LTO as input for this equation, the total GA plus AT LTOs are multiplied by 0.72.

b) GA LTO is the landing / take-off activity of general aviation at the airport and AT LTO is the landing/take off activity of air taxi at the airport.

c) Concentration of lead in fuel, [Pb]: The maximum lead concentration specified by ASTM for 100LL is 0.56 grams per liter or 2.12 grams per gallon. This amount of lead is normally added to assure that the required lean and rich mixture knock values are achieved. Multiplying this lead concentration in avgas by the weighted average fuel usage rate produces an overall average value of 7.34 grams of lead per LTO (g Pb/LTO) for piston engines: 3.46 gal/LTO x 2.12 g Pb/gal = 7.34 g Pb/LTO.

d) Retention of lead in engine and oil (1-Pb Retention): Recent data collected from aircraft piston engines operating on leaded avgas suggests that about 5% of the lead from the fuel is retained in the engine and engine oil.[12]   thus the emitted fraction is 0.95. This information is used in calculating airport-specific lead inventories and will be used to develop future national estimates of lead emitted from the consumption of leaded avgas.

Airports Inventoried by the DEQ: Emissions Estimates

Table 1. 2005 Aircraft Activity, Estimates of lead emissions using the LTO-based method.

County	Airport (98)	Air Taxi (AT)[1.]	General Aviation (GA)[1.]	Piston - Engine LTO [(2.)2]	Pb (Kg) [(2.)1.]	Pb(tons)
BAKER	Baker City Municipal Airport	1,767	5,988	5,583	39	0.043
BENTON	Corvallis Municipal Airport	3,084	33,548	26,375	185	0.203
CLACKAMAS	Country Squire Airpark Airport, Sandy	0	988	711	5	0.005
CLACKAMAS	Lenhardt Airpark Airport, Hubbard	0	2,990	2,153	15	0.017
CLACKAMAS	Sandy River Airport, Sandy	0	5,658	4,073	29	0.031
CLACKAMAS	Valley View Airport, Estacada	0	1,482	1,067	7	0.008
CLACKAMAS	*Port of Portland Mulino*	*0*	*18,298*	*13,175*	*92*	*0.101*
CLATSOP	Astoria Regional Airport	927	18,557	14,029	98	0.108
CLATSOP	Seaside Municipal Airport	195	1,019	874	6	0.007
COLUMBIA	Scappoose Industrial Airpark Airport	1,947	32,012	24,450	171	0.188
COLUMBIA	Vernonia Airfield Airport	0	1,482	1,067	7	0.008
COOS	Bandon State Airport	204	5,591	4,173	29	0.032
COOS	North Bend Municipal Airport (Southwest OR	3,678	11,804	11,147	78	0.086
COOS	Powers State Airport	0	186	134	1	0.001
CROOK	Prineville Airport	153	5,013	3,719	26	0.029
CURRY	Brookings State Airport	570	7,179	5,580	39	0.043
CURRY	Cape Blanco State Airport, Denmark	24	309	240	2	0.002
CURRY	Gold Beach Municipal Airport	386	2,522	2,094	15	0.016
DESCHUTES	Bend Municipal Airport	0	19,443	13,999	98	0.108
DESCHUTES	Roberts Field Airport, Redmond	5,869	23,135	20,883	146	0.161
DESCHUTES	Sisters Eagle Air Airport	49	653	505	4	0.004
DESCHUTES	Sunriver Airport	718	7,806	6,137	43	0.047
DOUGLAS	George Felt Airport, Roseburg	0	754	543	4	0.004
DOUGLAS	Lakeside State Airport	53	709	548	4	0.004
DOUGLAS	Myrtle Creek Municipal Airport	0	1,142	822	6	0.006
DOUGLAS	Roseburg Regional Airport	685	13,094	9,921	69	0.076
DOUGLAS	Toketee State Airport, Clearwater	0	174	125	1	0.001
GILLIAM	Arlington Municipal Airport	36	499	385	3	0.003
GILLIAM	Condon State Pauling Field Airport	22	1,646	1,201	8	0.009
GRANT	Grant Co Regional/Ogilvie Field Airport, John	759	3,916	3,366	24	0.026
GRANT	Monument Municipal Airport	0	65	47	0	0.000
HARNEY	Burns Municipal Airport	602	2,899	2,521	18	0.019
HOOD RIVER	Cascade Locks State Airport	0	754	543	4	0.004
HOOD RIVER	Hood River Airport (Ken Jarnstedt AP)	71	7,104	5,166	36	0.040
JACKSON	Ashland Municipal-Sumner Parker Field Airpc	7,775	11,329	13,754	96	0.106
JACKSON	Pinehurst State Airport	0	312	225	2	0.002
JACKSON	Prospect State Airport	96	496	426	3	0.003
JACKSON	Rogue Valley International-Medford	11,214	18,301	21,250	149	0.164
JEFFERSON	City-County Airport, Madras	318	5,004	3,831	27	0.030
JEFFERSON	Lake Billy Chinook State Airport, Culver	0	282	203	1	0.002
JOSEPHINE	Grants Pass Airport	200	12,110	8,863	62	0.068
JOSEPHINE	Illinois Valley Airport, Cave Junction	0	3,715	2,675	19	0.021
KLAMATH	Beaver Marsh State Airport	0	75	54	0	0.000
KLAMATH	Chiloquin State Airport	244	1,063	941	7	0.007
KLAMATH	Crescent Lake State Airport	0	150	108	1	0.001
KLAMATH	Klamath Falls International, Kingsley Field	2,071	16,140	13,112	92	0.101
KLAMATH	Malin Airport	0	348	251	2	0.002
LAKE	Alkali Lake State Airport	0	50	36	0	0.000
LAKE	Christmas Valley Airport	50	955	723	5	0.006
LAKE	Lake County Airport, Lakeview	598	2,441	2,188	15	0.017
LAKE	Paisley State Airport	50	101	108	1	0.001
LAKE	Silver Lake F S Strip Airport	3	25	20	0	0.000
LANE	Cottage Grove State Airport	251	8,118	6,026	42	0.046
LANE	Florence Municipal Airport	257	2,387	1,904	13	0.015
LANE	Hobby Field Airport, Creswell	375	17,856	13,127	92	0.101
LANE	Lake Woahink Seaplane Base, Florence	0	1,482	1,067	7	0.008
LANE	Mahlon Sweet Field (Eug)	11,488	31,021	30,606	214	0.236
LANE	Mc Kenzie Bridge State Airport	0	198	143	1	0.001
LANE	Oakridge State Airport	154	704	618	4	0.005
LANE	Siltcoos Lake Seaplane Base	0	50	36	0	0.000

LINCOLN	Newport Municipal Airport	738	8,301	6,508	46	0.050
LINCOLN	Siletz Bay State Airport, Gleneden Beach	104	2,355	1,770	12	0.014
LINCOLN	Toledo State Airport	0	572	412	3	0.003
LINCOLN	Wakonda Beach State Airport, Waldport	0	414	298	2	0.002
LINN	Albany Municipal Airport	340	11,463	8,497	59	0.065
LINN	Lebanon State Airport	197	6,663	4,939	35	0.038
LINN	Santiam Junction State Airport	0	50	36	0	0.000
MALHEUR	Mc Dermitt State Airport	98	893	714	5	0.005
MALHEUR	Miller Memorial Airpark Airport, Vale	0	988	711	5	0.005
MALHEUR	Ontario Municipal Airport	1,117	6,699	5,627	39	0.043
MALHEUR	Owyhee Reservoir State Airport	0	276	199	1	0.002
MALHEUR	Rome State Airport	0	50	36	0	0.000
MARION	Aurora State Airport	3,855	35,287	28,182	197	0.217
MARION	Davis Airport, Gates	50	448	359	3	0.003
MARION	McNary Field (Salem)	867	22,470	16,803	118	0.129
MORROW	Boardman Airport	23	1,810	1,319	9	0.010
MORROW	Lexington Airport	10	1,804	1,306	9	0.010
MULTNOMAH	Portland Downtown Heliport	1,002	1,329	1,679	12	0.013
MULTNOMAH	*Port of Portland Troutdale*	*1,782*	*34,219*	*25,921*	*181*	*0.200*
MULTNOMAH	*Port of Portland PDX*	*37,308*	*16,039*	*38,410*	*269*	*0.296*
POLK	Independence State Airport	635	17,698	13,200	92	0.102
SHERMAN	Wasco State Airport	24	1,226	900	6	0.007
TILLAMOOK	Nehalem Bay State Airport, Manzanita	11	1,107	805	6	0.006
TILLAMOOK	Pacific City State Airport	296	958	903	6	0.007
TILLAMOOK	Tillamook Airport	250	8,950	6,624	46	0.051
UMATILLA	Eastern Regional Airport-Pendleton	3,024	8,408	8,231	58	0.063
UMATILLA	Hermiston Municipal Airport	243	7,567	5,623	39	0.043
UNION	La Grande/Union County Airport	1,285	7,822	6,557	46	0.050
WALLOWA	Enterprise Municipal Airport	218	2,200	1,741	12	0.013
WALLOWA	Joseph State Airport	120	2,154	1,637	11	0.013
WALLOWA	Memaloose Airport, Imnaha	75	225	216	2	0.002
WASCO	Columbia Gorge/The Dalles Airport	903	10,438	8,166	57	0.063
WASHINGTON	Skyport Airport, Cornelius	0	988	711	5	0.005
WASHINGTON	Starks Twin Oaks Airpark Airport, Hillsboro	0	11,133	8,015	56	0.062
WASHINGTON	*Port of Portland Hillsboro*	*5,688*	*123,329*	*92,892*	*650*	*0.715*
YAMHILL	Chehalem Airpark Airport, Newberg	226	5,375	4,033	28	0.031
YAMHILL	McMinnville Municipal Airport	650	34,131	25,042	175	0.193
YAMHILL	Sportsman Airpark Airport, Newberg	50	5,808	4,217	30	0.032
						4.950

Notes:

(1). Airports Inventoried by the DEQ, 2005 Activity Data in LTOs. Taken from:
  H:\2005NEI_CERR\Nonroad\Aircraft\SupportData
  LTO data from averaged from BTS, ATADS, TAF, and AirNAV data

(2). http://www.epa.gov/ttn/chief/net/tsd_avgas_pb_inventory_2002.pdf
  EPA Document: Lead Emissions from the Use of Leaded Aviation Gasoline in the United States (Ref.676)
  Applying these parameters in the equation above yields the following equation: (Ref. 676, page 5 and 6)

Airports Inventoried by the DEQ: Activity:

The Port of Portland provided activity and emissions data for Portland International, Hillsboro, Troutdale, and Mulino airports [1]. The Port inventories covered all four aircraft fleet types. The 4 airports that were inventoried by the DEQ, by aircraft fleet are shown in Table 3.

For the remaining small 94 airports, the commercial aviation activity was provided to the DEQ by Reference Services at the National Transportation Library of the BTS[2]. In addition to Portland International, the BTS data showed commercial aviation LTOs for nine airports: Roberts Field, Brookings State, Mahlon Sweet Field, Hermiston State, Kingsley Field, LaGrande/Union County, Medford, North Bend Municipal (Coos Bay), and Pendleton Municipal. The activity was specific to aircraft type.

The activity for general aviation, air taxi, and military fleets is an average of LTO data from the BTS, the FAA Air Traffic Activity Data System (ATADS)[3], the FAA Terminal Area Forecast (TAF)[4], and the AirNAV informational website[5]. The ATADS and BTS data was was provided to the DEQ by Reference Services at the National Transportation Library of the BTS. All LTO data was fleet specific. An average of LTO data was used for each fleet as there were slight differences between the numbers of LTOs from each data source.

LTOs for the 94 airports that were inventoried by the DEQ, by aircraft fleet are shown in Table 2

Table 2. Airports Inventoried by the DEQ, 2005 Activity Data in LTOs.

County	Airport	(1) Air Taxi	(2) Commercial Aviation	(1) General Aviation	(1) Military Aircraft
BAKER	Baker City Municipal Airport	1,767	0	5,988	0
BENTON	Corvallis Municipal Airport	3,084	0	33,548	406
CLACKAMAS	Country Squire Airpark Airport, Sandy	0	0	988	0
CLACKAMAS	Lenhardt Airpark Airport, Hubbard	0	0	2,990	0
CLACKAMAS	Sandy River Airport, Sandy	0	0	5,658	0
CLACKAMAS	Valley View Airport, Estacada	0	0	1,482	0
CLATSOP	Astoria Regional Airport	927	0	18,557	10,138
CLATSOP	Seaside Municipal Airport	195	0	1,019	195
COLUMBIA	Scappoose Industrial Airpark Airport	1,947	0	32,012	750
COLUMBIA	Vernonia Airfield Airport	0	0	1,482	0
COOS	Bandon State Airport	204	0	5,591	36
COOS	North Bend Municipal Airport (Southwest OR Reg. AP)	3,678	3	11,804	2,843
COOS	Powers State Airport	0	0	186	0
CROOK	Prineville Airport	153	0	5,013	53
CURRY	Brookings State Airport	570	4	7,179	30
CURRY	Cape Blanco State Airport, Denmark	24	0	309	0
CURRY	Gold Beach Municipal Airport	386	0	2,522	83
DESCHUTES	Bend Municipal Airport	0	0	19,443	0
DESCHUTES	Roberts Field Airport, Redmond	5,869	3,197	23,135	280
DESCHUTES	Sisters Eagle Air Airport	49	0	653	0
DESCHUTES	Sunriver Airport	718	0	7,806	0
DOUGLAS	George Felt Airport, Roseburg	0	0	754	0
DOUGLAS	Lakeside State Airport	53	0	709	0
DOUGLAS	Myrtle Creek Municipal Airport	0	0	1,142	0
DOUGLAS	Roseburg Regional Airport	685	0	13,094	0
DOUGLAS	Toketee State Airport, Clearwater	0	0	174	0
GILLIAM	Arlington Municipal Airport	36	0	499	0
GILLIAM	Condon State Pauling Field Airport	22	0	1,646	0
GRANT	Grant Co Regional/Ogilvie Field Airport, John Day	759	0	3,916	0
GRANT	Monument Municipal Airport	0	0	65	0
HARNEY	Burns Municipal Airport	602	0	2,899	40
HOOD RIVER	Cascade Locks State Airport	0	0	754	0
HOOD RIVER	Hood River Airport (Ken Jarnstedt AP)	71	0	7,104	0
JACKSON	Ashland Municipal-Sumner Parker Field Airport	7,775	0	11,329	0
JACKSON	Pinehurst State Airport	0	0	312	0
JACKSON	Prospect State Airport	96	0	496	0
JACKSON	Rogue Valley International-Medford	11,214	5,986	18,301	328
JEFFERSON	City-County Airport, Madras	318	0	5,004	53
JEFFERSON	Lake Billy Chinook State Airport, Culver	0	0	282	0
JOSEPHINE	Grants Pass Airport	200	0	12,110	50
JOSEPHINE	Illinois Valley Airport, Cave Junction	0	0	3,715	0
KLAMATH	Beaver Marsh State Airport	0	0	75	0
KLAMATH	Chiloquin State Airport	244	0	1,063	0
KLAMATH	Crescent Lake State Airport	0	0	150	0
KLAMATH	Klamath Falls International, Kingsley Field	2,071	8	16,140	7,470
KLAMATH	Malin Airport	0	0	348	0
LAKE	Alkali Lake State Airport	0	0	50	0
LAKE	Christmas Valley Airport	50	0	955	0
LAKE	Lake County Airport, Lakeview	598	0	2,441	0
LAKE	Paisley State Airport	50	0	101	0
LAKE	Silver Lake F S Strip Airport	3	0	25	0
LANE	Cottage Grove State Airport	251	0	8,118	0
LANE	Florence Municipal Airport	257	0	2,387	388
LANE	Hobby Field Airport, Creswell	375	0	17,856	0
LANE	Lake Woahink Seaplane Base, Florence	0	0	1,482	0
LANE	Mahlon Sweet Field (Eug)	11,488	6,983	31,021	879
LANE	Mc Kenzie Bridge State Airport	0	0	198	0
LANE	Oakridge State Airport	154	0	704	0
LANE	Siltcoos Lake Seaplane Base	0	0	50	0

Table 2, continued

County	Airport	(1) Air Taxi	(2) Commercial Aviation	(1) General Aviation	(1) Military Aircraft
LINCOLN	Newport Municipal Airport	738	0	8,301	1,238
LINCOLN	Siletz Bay State Airport, Gleneden Beach	104	0	2,355	0
LINCOLN	Toledo State Airport	0	0	572	0
LINCOLN	Wakonda Beach State Airport, Waldport	0	0	414	0
LINN	Albany Municipal Airport	340	0	11,463	0
LINN	Lebanon State Airport	197	0	6,663	0
LINN	Santiam Junction State Airport	0	0	50	3
MALHEUR	Mc Dermitt State Airport	98	0	893	0
MALHEUR	Miller Memorial Airpark Airport, Vale	0	0	988	0
MALHEUR	Ontario Municipal Airport	1,117	0	6,699	0
MALHEUR	Owyhee Reservoir State Airport	0	0	276	0
MALHEUR	Rome State Airport	0	0	50	0
MARION	Aurora State Airport	3,855	0	35,287	125
MARION	Davis Airport, Gates	50	0	448	0
MARION	McNary Field (Salem)	867	0	22,470	1,772
MORROW	Boardman Airport	23	0	1,810	0
MORROW	Lexington Airport	10	0	1,804	6
MULTNOMAH	Portland Downtown Heliport	1,002	0	1,329	51
POLK	Independence State Airport	635	0	17,698	0
SHERMAN	Wasco State Airport	24	0	1,226	0
TILLAMOOK	Nehalem Bay State Airport, Manzanita	11	0	1,107	0
TILLAMOOK	Pacific City State Airport	296	0	958	0
TILLAMOOK	Tillamook Airport	250	0	8,950	146
UMATILLA	Eastern Regional Airport-Pendleton	3,024	1,150	8,408	705
UMATILLA	Hermiston Municipal Airport	243	4	7,567	50
UNION	La Grande/Union County Airport	1,285	166	7,822	241
WALLOWA	Enterprise Municipal Airport	218	0	2,200	0
WALLOWA	Joseph State Airport	120	0	2,154	0
WALLOWA	Memaloose Airport, Imnaha	75	0	225	0
WASCO	Columbia Gorge/The Dalles Airport	903	0	10,438	411
WASHINGTON	Skyport Airport, Cornelius	0	0	988	0
WASHINGTON	Starks Twin Oaks Airpark Airport, Hillsboro	0	0	11,133	0
YAMHILL	Chehalem Airpark Airport, Newberg	226	0	5,375	0
YAMHILL	McMinnville Municipal Airport	650	0	34,131	635
YAMHILL	Sportsman Airpark Airport, Newberg	50	0	5,808	0

Notes:
(1) LTO data from averaged from BTS, ATADS, TAF, and AirNAV data.
(2) LTO data from BTS

Table 3. The Port of Portland airport, Hillsboro Airport and Troutdale Airport, Mulino Airport
Estimates of lead emissions using the LTO-based method.

PDX LTO — **New Methodology**

Code	Total	Unit	Commercial	Air Taxi	General Aviation	Military	Piston - Engine LTO [(2.)2]	LEAD (Kg) [(2.)1.]	LEAD (tons)
Fleet LTOs (1)	125639	LTO	68555	37308	16039	3737	38,410	269	0.296

Hillsboro Airport LTO

Code	Total	Unit	Commercial	Air Taxi	General Aviation	Military	Piston - Engine LTO [(2.)2]	LEAD (Kg) [(2.)1.]	LEAD (tons)
Fleet LTOs (2)	129275.9	LTO	0	5688.1	123329.2	258.551714	92,892	650	0.715

Troutdale Airport LTO

Code	Total	Unit	Commercial	Air Taxi	General Aviation	Military	Piston - Engine LTO [(2.)2]	LEAD (Kg) [(2.)1.]	LEAD (tons)
Fleet LTOs (3)	36365	LTO	3.6365	1781.9	34219.47	360.0135	25,921	181	0.1996

Mulino Airport LTO

Code	Total	Unit	Commercial	Air Taxi	General Aviation	Military	Piston - Engine LTO [(2.)2]	LEAD (Kg) [(2.)1.]	LEAD (tons)
Fleet LTOs (4)	18298	LTO	0	0	18298	0	13,175	92	0.101

Notes:
H:\2005NEI_CERR\Nonroad\Aircraft\PortOfPortlandEIs
(1) Total 2005 LTOs from Port of Portland PDX EI:
  EI_FILES\2005NEI_CERR\Nonroad\Aircraft\PortOfPortlandEIs\UPDATED_2005_PROTECTED PDXwHAPs WITH 2CarsUPDATE.xls
  "NewSummary" sheet, cell S202.
  Fleet LTOs back-calculated from Sam Hartsfield fleet percentage estimates.(Ref.694) [13.]

Commercial	Air Taxi	General Aviation	Military
55%	30%	13%	3%

(2) Total 2005 LTOs from Port of Portland HIO EI:
  EI_FILES\2005NEI_CERR\Nonroad\Aircraft\PortOfPortlandEIs\protected HIO62wHAPs.xls
  "GASummary" sheet, cell H12. This includes touch-and-gos (TGO).
  The Hillsboro airport fleet percentages number and Notes (reference) taken from the
  Table2 in H:\2005NEI_CERR\Nonroad\Aircraft\PortOfPortlandEIs

Commercial	Air Taxi	General Aviation	Military
0%	4.4%	95.4%	0.2%

3) Total 2005 LTOs from Port of Portland TTD EI:
  EI_FILES\2005NEI_CERR\Nonroad\Aircraft\PortOfPortlandEIs\protected TTD62wHAPs.xls
  "GASummary" sheet, cell H12. This includes touch-and-gos (TGO).
  Fleet percentages taken from the:H:\2005NEI_CERR\Nonroad\Aircraft\PortOfPortlandEIs

Commercial	Air Taxi	General Aviation	Military
0.01%	4.9%	94.1%	0.99%

(4) Total 2005 LTOs from Port of Portland Mulino EI:
  EI_FILES\2005NEI_CERR\Nonroad\Aircraft\PortOfPortlandEIs\protected MULINO62wHAPs.xls
  "GASummary" sheet, cell H12. This includes touch-and-gos (TGO).
  Fleet percentages taken from the AirNAV website: *http://www.airnav.com/airport/4S9*

Commercial	Air Taxi	General Aviation	Military
0%	0%	100%	0%

Additional note for Table 3: All LTO data is from DEQ AQ Ref. 641.

Comparison of Results

Figure1. Shows Comparison of EPA lead emissions with DEQ lead emissions using the LTO based method.

State County	Airport Name	EPA-2002 Year [1.] Pb kilograms	DEQ-2005 Year Pb kilograms
BAKER	CITY MUNICIPAL	28	39
BENTON	CORVALLIS MUNI	247	185
CLACKAMAS	PORTLAND-MULINO	8	92
CLATSOP	ASTORIA REGIONAL	110	98
CLATSOP	SEASIDE MUNICIPAL	6	6
COLUMBIA	SCAPPOOSE INDUSTRIAL AI	187	171
COOS	NORTH BEND MUNI	93	78
COOS	BANDON STATE	39	29
CROOK	PRINEVILLE	23	26
CURRY	BROOKINGS	19	39
CURRY	GOLD BEACH MUNI	13	15
DESCHUTES	ROBERTS FIELD	127	146
DESCHUTES	BEND MUNI	93	98
DESCHUTES	SUNRIVER	43	43
DOUGLAS	ROSEBURG REGIONAL	57	69
DOUGLAS	MYRTLE CREEK MUNICIPAL	6	6
GILLIAM	CONDON STATE PAULINGFL	6	8
GRANT	GRANTCO RGNL/OGILVIEF	18	24
HARNEY	BURNSMUNI	12	18
HOOD RIVER	HOOD RIVER	36	36
JACKSON	ROGUE VALLEY INTERNATIO	142	149
JACKSON	ASHLAND MUNI-SUMNERPAR	52	96
JEFFERSON	CITY-COUNTY	24	27
JOSEPHINE	ILLINOIS VALLEY	2	19
JOSEPHINE	GRANTS PASS	60	62
KLAMATH	KLAMATH FALLS	80	92
KLAMATH	CHILOQUIN STATE	2	7
LAKE	LAKE COUNTY	12	15
LAKE	CHRISTMAS VALLEY	3	5
LANE	MAHLONSWEET FIELD	213	214
LANE	HOBBY FIELD	70	92
LANE	COTTAGE GROVE STATE	42	42
LANE	FLORENCE MUNI	12	13
LINCOLN	NEWPORT MUNI	36	46
LINCOLN	SILETZ BAY STATE	17	12
LINN	ALBANYMUNI	56	59
LINN	LEBANON STATE	42	35
MALHEUR	ONTARIO MUNI	39	39
MALHEUR	MC DERMITT STATE	4	5
MARION	AURORA STATE	197	197
MARION	MCNARY FLD	113	118
MORROW	BOARDMAN	13	9
MORROW	LEXINGTON	7	9
MULTNOMAH	PORTLAND-TROUTDALE	175	172
MULTNOMAH	PORTLAND DOWNTOWN	11	12
MULTNOMAH	PORTLAND INTL	352	81
POLK	INDEPENDENCE STATE	93	92
SHERMAN	WASCO STATE	6	6
TILLAMOOK	TILLAMOOK	26	46
UMATILLA	EASTERN OREGON REGIONAL	76	58
UMATILLA	HERMISTON MUNI	33	39
UNION	LA GRANDE/UNION COUNTY	44	46
WALLOWA	JOSEPH STATE	12	11
WASHINGTON	PORTLAND-HILLSBORO	549	619
YAMHILL	MC MINNVILLE MUNI	181	175
YAMHILL	SPORTSMAN AIRPARK	29	30

Notes-

1. Airport-specific estimates of lead emissions using the corrected version of the LTO method for estimating lead emissions.

    Data from : EPA (National Vehicle and fuel emissions laboratory)

    Memo to Pb NAAQS docket for Revised Airport Avgas Inventory using 2002 data corrected 14 May 08__.pdf (page 3~ 71)

    H:\INFO_REQ\FILES\MYP\Small airport emissions of lead

    http://www.epa.gov/ttn/chief/net/tsd_avgas_pb_inventory_2002.pdf

    EPA Document: Lead Emissions from the Use of Leaded Aviation Gasoline in the United States (Ref.676)

2. Estimate by DEQ using the LTO-based method.

ATTACHMENTS
There are no attachments; all tables are presented in the text above. However, the database containing the emissions, EF, and activity data is located at
\\DEQHQ1\EI_FILES\2005NEI_CERR\Nonroad\Aircraft\2005Airports.mdb
H:\INFO_REQ\FILES\MYP\Small Airport emissions of Lead.xlsx

REFERENCES

1. DEQ AQ. Ref. 641. Port of Portland: Airport emissions inventories and future year projections. Separate inventories for Portland International, Troutdale, Hillsboro, and Mulino Airports. CD received by the DEQ on April 13, 2007.

2. DEQ AQ. Ref. 800. 2005 Oregon aircraft LTOs. Reference Services, National Transportation Library, Bureau of Transportation Statisitics (BTS). Research and Innovative Technology Administration, US Dept. of Transportation. E-mail correspondence with Christopher Swab, Oregon DEQ, March 29, 2007.:

3. DEQ AQ. Ref. 800. 2005 Oregon aircraft LTOs. FAA Air Traffic Activity Data System (ATADS). Reference Services, National Transportation Library, Bureau of Transportation Statistics. Research and Innovative Technology Administration, US Dept. of Transportation. E-mail correspondence with Christopher Swab, Oregon DEQ, March 29, 2007.

4. DEQ AQ. Ref. 803. 2005 Oregon aircraft LTOs. FAA Terminal Area Forecast (TAF). INTERNET: *http://www.apo.data.faa.gov/main/taf.asp* Tables downloaded included Airport Operations and Airports.

5. DEQ AQ. Ref. 801. 2005 Oregon aircraft LTOs. AirNAV. INTERNET: *http://www.airnav.com/airports/state/OR.html*

6. DEQ AQ. Ref. 641a. Emissions and Dispersion Modeling System (EDMS 5.0.1). Federal Aviation Administration Office and Environment and Energy, and CSSI, Inc. Washington DC, January 2007. *(Model installation CD with hardcopy instructions available upon request)*

7. DEQ AQ Ref. 623. Emission Factor and Inventory Group (D205-01). 2004/2005. *Documentation For The 2002 Base Year National Emission Inventory For Hazardous Air Pollutants.* United States Environmental Protection Agency, Research Triangle Park, NC. March 2005. *note: this reference is in binder format at DEQ HQ: a complete electronic copy of the reference may be found here:* http://www.epa.gov/ttn/chief/net/2002inventory.html#inventorydata

8. DEQ AQ Ref. 642. E-mail correspondence between Steven Mrazek, Port of Portland, and Jeffrey Stocum, Oregon DEQ. Subject: Revised Calculations. Attachment: "Aircraft Haps Airforce Factors Revision.xls". April 22, 2003.

9. DEQ AQ Ref.676. EPA Document: Lead Emissions from the Use of Leaded Aviation Gasoline in the United States Website: http://www.epa.gov/ttn/chief/net/tsd_avgas_pb_inventory_2002.pdf

10. DEQ AQ Ref. 804. The FAA GAATA is a database collected from surveys of pilots flying aircraft used for general aviation and air taxi activity. For more information on the GAATA, see Appendix A at http://www.faa.gov/data_statistics/aviation_data_statistics/general_aviation/CY2005/

11. There are about 194,000 piston-engine aircraft in the U.S. general aviation and air taxi fleet (175,000 single-engine and 19,000 twin-engine aircraft) according to FAA's 2005 GAATA Survey): http://www.faa.gov/data_research/aviation_data_statistics/general_aviation/CY2005/

12. The information used to develop this estimate is from the following references: (a) DEQ AQ Ref. 802. Todd L. Petersen, Petersen Aviation, Inc, *Aviation Oil Lead Content Analysis*, Report # EPA 1-2008, January 2, 2008, available at William J. Hughes Technical Center Technical Reference and Research Library at http://actlibrary.tc.faa.gov/ and (b) DEQ AQ Ref. 676, p. 5, footnote (b). E-mail from Theo Rindlisbacher of Switzerland Federal Office of Civil Aviation to Bryan Manning of U.S. EPA, regarding lead retained in engine, September 28, 2007.

13. DEQ AQ Ref.694. E-mail from Sam Hartsfield, POP, to Christopher Swab. EI Numbers (PDX LTO comparison). April 05, 2007.

PREPARED BY:
MYP. November.25 .2008
Revise: MYP. May 4, 2010

QA: WCR. 04May2010, reviewed the total fleet LTOs and the percent allocation to Air Taxi and General Aviation. Miyoung's correction is appropriate as the previous percentage allocation estimates did not match with the total LTOs.

1/20/12: Reference list reviewed for completeness, and electronic copies of all references generated, with associated DEQ AQ Reference Numbers appended, by C. Swab. This was done to fulfill a public records request submitted to DEQ by Miki Barnes, Oregon Aviation Watch, on 11/29/12.